

# Brain Drain and Brain Gain: A New Perspective on Highly Skilled Migration

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## Abstract

In the context of increased transfers of human capital to developed countries, the brain drain has become again a topical issue. Our paper investigates not only the obvious direct loss effects – the so called brain drain – but also the possibility of more subtle indirect beneficial effects. We develop two potential channels for a brain gain: an *ex ante* gain conditioned by informational asymmetries and an ex-post gain through scientific diaspora networks, trying to set them against a sound theoretical underpinning. Our case study focuses on Romania and although available data are very limited, we find evidence confirming the first hypothesis. As regards the second, the evidence suggest it is still a developing option, having nevertheless a significant potential. All in all through we bring a new perspective on highly skilled migration as a phenomenon entailing also positive developmental effects through additional human capital accumulation and use of expatriates' skills.

## Introduction

This paper studies the growth effects of highly skilled migration on the origin developing countries. Although in the present context of increased transfers of human capital to developed countries the brain drain is a topical issue, our focus, in line with the most recent theoretical developments, is the hypothesis of a brain gain.

The purpose of this section is introductory. We commence by explaining the role of human capital in the new endogenous growth approach. This leads us to an understanding of highly skilled migration as a brake on the development of sending countries. However, a new perspective on migration concerning more subtle beneficial implications has started to develop and this is the focus of this paper. The last section provides a brief outline of subsequent chapters.

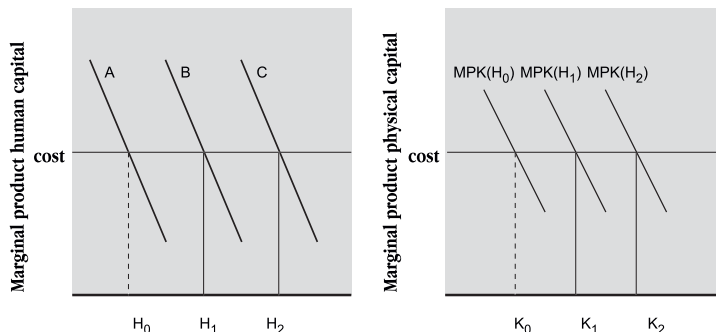
### *The new endogenous growth theory*

One of the oldest and most important questions that economics tries to answer refers to the causes of persistent prosperity differentials across countries. It is one of the issues that puzzle neoclassical economists because traditional growth theory sustains the convergence hypothesis.

A new way of thinking about growth started to develop at the end of the 1980s with the work of Lucas and Romer in endogenous growth theory. Instead of settling to measure the productivity residual, they try to explain endogenously the process of technological progress (Ghatak and Sassoon, 2001). Human capital accumulation is approached not only as an individual, but also as a social activity because of the positive spillovers it generates.

The key element underpinning the convergence hypothesis of neoclassical theory is the decreasing marginal product of capital. With a constant marginal product of capital however, there is no steady state level thus ruling out the idea of convergence (Miles and Scott, 2002). To explain this, endogenous growth theory adopts a broader concept of capital: physical capital and human capital are seen as complementary inputs into production. It no longer considers fixed the other form of capital in the calculation of the marginal product so that they create a virtuous circle.

Figure 1.1: Interaction between human and physical capital



The figure below illustrates how the two forms of capital interact. Essentially the idea is that more technical knowledge makes skilled labour more productive, thus shifting the marginal product of

human capital curve from A to B. This encourages the accumulation of H1 human capital which in turn boosts the productivity of machines – there is a shift from MPK (H0) to MPK (H1). Given the cost of capital, this leads to an increase in the stock of capital to K1. This new level means the marginal product to human capital again increases and thus more is accumulated reaching H2. So, although each category of capital on its own has a decreasing marginal product, by approaching capital as including both human and physical capital, the marginal product is constant (Miles and Scott, 2002).

Thus, the emphasis moves to the role of human capital and on increasing returns to knowledge as endogenous determinants of long run growth and differentials in development between countries (Carrington and Detragiache, 1998).

### *The new importance of skilled migration*

The accumulation of human capital is especially relevant to developing countries that need to catch up. In this light the topic of migration gains new importance and especially the migration of the highly skilled becomes a sensitive issue with developmental implications.

The concept of “brain drain” designates the international transfer of resources in the form of human capital, i.e. the migration of relatively highly educated individuals from developing to developed countries. (Beine et al, 2001). Although definitions are not always uniform, the term “highly educated” generally designates individuals who have attained at least a degree in tertiary education.

The brain drain reduces economic growth through the depletion of a source country's human capital assets and additionally through unrecompensed investments in education. The term gained wide usage in the late 1960s as developed countries were attracting skilled personnel. Today it is again a very topical issue as skilled migration flows have considerably increased, partly as effect of explicit poaching policies. The brain drain is now characterized by a demand-pull on the side of the receiving countries, the immigration policies of which are reflecting domestic labour-market shortages. Combined with traditional self-selection effects on the supply side, this leads to much higher migration rates among the highly educated and increased transfers of human capital from developing to developed countries (Beine et al, 2001).

In the new endogenous growth framework, the topic has been investigated by Haque and Kim (1995), who underline the detrimental growth effects of brain migration on the origin country. Their mathematical rationale shows that the growth rate of the origin country is a decreasing function of the brain drain (Haque and Kim, 1995).

Thus the brain drain gains importance on both empirical and theoretical grounds as a negative phenomenon. Recently, the literature has introduced a new concept – brain gain – suggesting the possibility of positive effects. This is the direction of research in our paper. Our analysis regarding the macroeconomic effects of highly skilled migration on the origin developing countries aims to examine not only the obvious direct loss effects – the so called brain drain – but also the possibilities of indirect beneficial effects which are more subtle.

### *Outline*

The most recent studies on brain drain emphasize the importance of incentives and opportunities facing individuals (Stark et al., 1997 and 1998; Mountford, 1997; Beine et al., 2001). The second chapter presents two models proposed by Mountford, as he provides the strongest argument to the

hypothesis of a brain gain. The key idea is that under uncertainty about migration part of the additional human capital accumulated might constitute a brain gain for the home country.

As the significance of theoretical models is measured by their relevance in understanding reality, we follow our research in chapter three with an empirical analysis, which aims at testing our theoretical conclusions. Our focus is the brain drain from Romania, but the investigation also discusses the situation of the other CEECs<sup>1</sup>. Although the analysis is limited by difficulties in collecting reliable data, we find evidence confirming the theory in the existence of a skill biased migration accompanied by a stimulus on human capital formation.

After analyzing the *ex-ante* brain gain, in chapter four we turn our attention to the *ex-post* consequences of migration. A new approach to the brain drain is based on the idea that the expatriated, far from being a loss can be an asset for the origin country. The concept of social capital helps us to understand the potential diaspora networks have for an effective involvement in the development of the country. We examine again the Romanian case, finding evidence that this is yet only a developing strategy that nevertheless has a considerable potential.

## 2: Modelling the *Ex-Ante* Brain Gain

The introductory section has explained the main points underlying the growth framework in which the models discussing migration will be set. The aim of this was to emphasize that human capital is a linchpin in the endogenous growth theory based on complementary inputs and interdependencies in production.

Regarding human capital in this light implies that migration of the skilled will act as a brake on the economic development of sending countries. This is also the conclusion of Haque and Kim (1995) in their model of brain drain. However a new class of models offers a different perspective.

### *A new idea- educational incentives and uncertainty*

The most recent studies on the brain drain issue place the emphasis on the change in incentives facing individuals. Mountford (1997) develops the study of the topic in this interesting direction<sup>2</sup>. As Beine et al. (2001) underline, in a poor economy with an inadequate growth potential, the return to human capital is likely to be low and hence leads to a limited incentive to acquire education, which further limits growth. However, the key difference between a closed economy and one opened for migration is not only in opportunities but also in the incentives confronted by people (Stark et al., 1997). The possibility of migration constitutes an increased incentive to acquire skills and thus there is a possibility of a beneficial brain drain in circumstances of uncertainty. Given that only a proportion of the workers will actually emigrate, in the end the sending country might have a higher average level of human capital, i.e. a brain gain occurs. A further mechanism for beneficial effects is also discussed in Mountford, regarding the formation of educational classes in an economy. A brain drain can change the dynamics of 'class' formation and thus an under-educated class fails to develop (Mountford, 1997).

1 Central and Eastern European Countries - our case study refers to Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovakia and Slovenia.

2 Stark et al. (1998) have studied the brain drain from the same perspective of *ex-ante* brain gain. However, their aim is only to show a possibility, so their model is simpler and considers the issue in the context of a neoclassical production function that exhibits diminishing returns to scale therefore it misses the dynamic context in which Mountford sets the discussion.

### *The first model – Educational incentives and uncertain brain migration*

The model considers a small open economy that produces one good. The production function exhibits constant returns to scale:

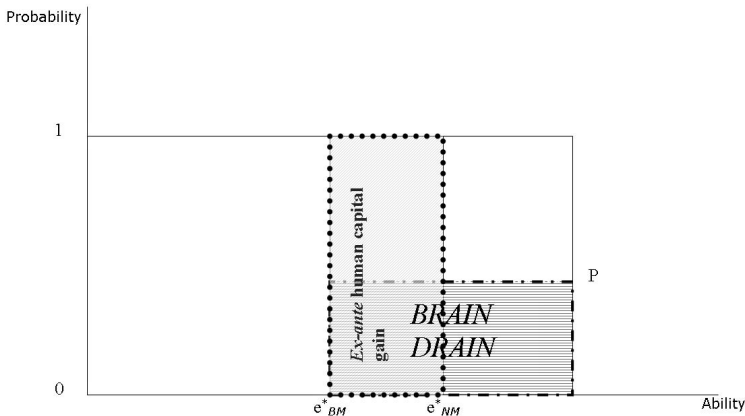
$Y = f(Kt, xtLt)$ , where  $Kt$  is the stock of physical capital,  $Lt$  stands for efficiency units of labour and  $xt$  gives the productivity of labour.

The agents are assumed to be heterogeneous in their abilities, which are given for each generation by a distribution between 0 and  $E$ . There is no effect from the parents' educational level.

Agents live for three periods. The education investment is a discrete either/or decision taken in the first period and financed through a loan. In the second period agents work and have to pay back their investment and save for the third period when they consume. Utility maximisation refers in fact to taking the optimal education decision. Thus, all agents with ability above a threshold value (let it be  $e^*$ ) will invest in education.

The dynamics of the model stems from a growth externality assuming that the current level of productivity is directly dependent on the previous level of human capital. This type of externality has been widely used theoretically and is supported empirically at both macro and micro levels (Mountford, 1997). Moreover, it is consistent with the idea of complementary inputs explained in the previous chapter.

Figure 2.1: Gains and losses from migration



By introducing migration into the model, as expected returns to human capital increase, more agents opt for education. The possibility of migration is offered explicitly only to educated agents and it will lower the threshold level of ability  $e^*$ , thus increasing the amount of educated agents. Whether skilled migration has an overall beneficial effect is a matter of empirical observation as it depends on the relative size of both effects, as the figure shows.

It follows that there is an optimal probability  $\pi$  for which skilled migration leaves the country with

more educated agents and short and long run productivity increase.

The mathematical formula derived by Mountford show that the positive effect is more likely to dominate if the brain drain is low ( $\pi$ ) and the proportion of educated agents was previously low. The possibility of migration has thus to be sufficiently high to stimulate enough agents to take on education, but sufficiently low to allow a considerable proportion to stay in the country. His conclusion is sustained empirically by the conclusions of Beine et al. (2001), who in an analysis of migration from least developed countries to the United States find that winners combine low levels of human capital with low migration rates<sup>3</sup>. This is encouraging as it suggests a break out of the underdevelopment trap. By contrast, negative net effects are in countries combining a migration rate above 20% and a proportion of highly educated above 5% (Beine et al., 2001).

### *The second model – Multiple steady states and under education trap*

In the previous model complementary inputs cause positive spillovers and create a virtuous circle. The second model considered by Mountford is set in a more complex environment, allowing also for negative spillovers. Migration can then have trap-breaking effects.

By changing the nature of the education decision into a continuous choice variable there are no longer only two educational classes and their formation is influenced by migration.

The human capital production function is modelled as an increasing function of the parents' level of human capital and of the resources invested by the agent in his/her education. In other words there is an additional family level externality such that the higher the parents' level of human capital, the higher the initial ability of the individual.

Utility maximisation is again equivalent to maximising third period income by choosing the optimal amount of investment in education.

The intergenerational spillover adds dynamics to the production function and together with the growth externality turn the model from one about productivity levels to one about the growth rate of productivity (Mountford, 1997). If the average level of human capital rises, this allows productivity to rise. This in turn increases returns to education and further spurs productivity.

As agents in the economy have many educational choices, more steady states are possible and from a given average level of human capital the economy can converge to a lower or higher equilibrium. An under-education trap (poverty trap) becomes possible. Intuitively this idea can be understood by considering the production process in a poor country as a chain with many weak links (Miles and Scott, 2002). Thus the returns to more education will be hindered by spillovers from the other weak links and the optimal education decision converges to a low state.

By introducing brain migration the skills composition changes. Emigrants will have on average a higher level of human capital than non-emigrants do, so from this point of view migration will reduce the level of productivity in the economy. However, the positive effect on human capital might predominate.

The problem lies in the fact that although the formation of more human capital occurs *ex-ante*, its positive spillovers will mostly emerge *ex-post*. In the case of general emigration (i.e. migration is uniformly distributed among uneducated and educated alike) the distribution of human capital is similar

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3 Beine et al. (2001) are the first to test this model empirically. They use the data set by Carrington and Detragiache (1998) who have computed emigration rates at three educational levels (primary, secondary, tertiary) for a large set of developing countries. Their analysis finds that the positive impact on human capital formation predicted by the theory is consistent with the reality.

among the emigrants and the non-emigrants. So if the possibility of migration changes the composition of skills in a positive way *ex-ante*, and migration does not change that composition, it follows that the country will always have to gain.

However, as the recent skill oriented immigration policies of developed countries also suggest<sup>4</sup>, the more likely case is that of a skill biased migration. In this case the problem is that although the possibility of migration affects beneficially the factor endowment of the economy *ex-ante*, the actual migration changes the composition of skills negatively. As long as uncertainty exists, it is possible that the *ex-ante* effect will dominate and the country will gain. The overall effect is given by comparing the average level of skills without and with migration.

In the case of multiple steady states there could be a threshold externality. Migration, by changing some fundamentals, might move the country towards convergence to a different steady state and thus help it break out of underdevelopment trap (Mountford, 1997).

The figure on next page explains this idea. By taking on the axes the level of human capital of parents in  $t$  (OX) – which will be the starting point for the next generation- and the level of human capital of offsprings in  $t+1$  (OY), we can draw the human capital accumulation schedule in both cases – without and with migration.

There are three crucial points of human capital level:  $e_1$  and  $e_3$  are the low and high steady states, while  $ee$  is a threshold – all agents endowed with abilities below that will be trapped in the low equilibrium, while all agents with ability above  $ee$  will converge toward the high steady state.

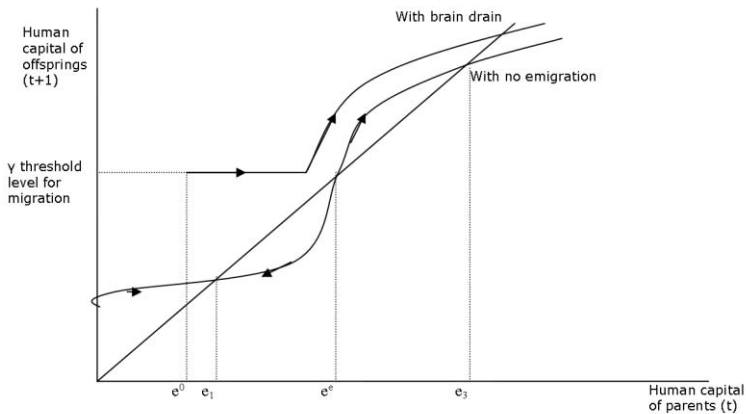
Without the chance of migration people with inherited ability below  $ee$  would get stuck in a poverty trap converging to the low state equilibrium. Introducing a threshold level of human capital? which conditions migration, there will be three categories of agents. Agents with inherited ability above  $ee$  will invest over that threshold value anyway. Moreover, an additional number of agents distributed below  $ee$  will find it optimal to acquire exactly? to be eligible for migration – let this minimum level be  $e_0$ . If  $e_0 < e_1$  the new curve for human capital accumulation will shift resulting in eliminating the low steady state trap (see figure 2.2 on next page).

All agents between  $e_0$  and  $E$  will converge to the high steady state. All agents between 0 and  $e_0$  will stay on the same curve as without migration, as there is no change in their incentives, but by converging to  $e_1$  on the long run they will converge to the high steady state they will jump on the other curve. So the undereducated class fails to develop.

Thus in a poor country the incentive environment can push part of the people in a poverty trap and skilled migration can be a mechanism of breakthrough. Even though some of the most able migrate, the composition of skills is improved on the long term anyway.

To sum up we have presented a very interesting idea of beneficial brain drain. In the context of informational asymmetries, Mountford has shown that the opening up of an economy will have important previously unconsidered effects. As new opportunities and incentives develop, the human capital accumulation schedule of the economy might change and push the country to a higher growth rate. The negative impact of the brain drain remains of course highly considerable and the overall effect is an empirical matter. This brings us to our case study which is presented in the next chapter.

<sup>4</sup> Recent immigration policy in countries like Germany, Canada or Australia is designed as a points system that depends positively on education, skills, experience and others.

FIGURE 2.2: *The effect of brain migration on the human capital accumulation schedule*

### 3. Case Study – The Brain Drain from Romania and the Other CEECs

After the fell of Communist regimes in Eastern Europe, and the subsequent opening of borders, fears of large migration flows from East to West rose on both sides. However, these fears remained largely unconfirmed partly because people had optimistic expectations related to their regained freedom.

Indeed, in a few years the economic progress was apparent, such that some of the CEECs now already have positive rates of migration. This is not the case with Romania who still lags considerably behind from an economic point of view. In the last few years emigration has started to be a more serious problem, as people counteract the lack of opportunities in Romania by migration prospects. Moreover, studies show that it is rather the skilled and young who are the most likely to move abroad and they usually choose permanent emigration (MLSS, 2001).

Table 3.1 on next page offers the general image of emigration rates from the CEECs in the last decade.

Statistics do not differentiate between migrants according to their qualifications or educational background, so that the study of the phenomenon is seriously hamstrung by the vacuum in systematic data sources on migration of the highly skilled (Commander, 2001).

We have tried to overcome these constraints by gathering data from different case studies or surveys in an attempt to sketch an image of skilled migration from Romania. Where possible our analysis refers to all the CEECs in order to provide a more general image and a tem of comparison. However, the patterns and implications deduced here can only be rough estimations reflecting the data imperfections.

The essential idea underlying our proposed brain models is that prospective migration modifies the human capital accumulation schedule by providing people an incentive to invest in education. To begin with, section 3.1 brings evidence for the extent of Romanian brain drain. Next, in line with the



theoretical model we try to observe in section 3.2 if there is uncertainty about migration. Having established that, we turn in section 3.3 to providing empirical support to the hypothesis of a human capital gain. In this purpose we present the evolution of enrollment ratios, number of educational institutions and share of labour force with tertiary education. Although data are not necessarily comparable, we believe they give a sense of the empirical magnitude of the phenomenon and support to the idea of an overall brain gain.

*Table 3.1: Crude rate of net migration from the CEECs, 1994-2001*

Country	1994	1995	1996	1997	1998	1999	2000	2001
(in 1000 of population)								
Bulgaria								-21.9*
Czech Republic	1	1	1	1.2	0.9	0.9	0.6	-0.8
Hungary	0	0	0	0	0	0	1.8	1.4
Poland	-0.5	-0.5	-0.3	-0.3	-0.3	-0.4	-0.5	-0.4
Romania	-0.7	-0.9	-0.9	-0.6	-0.3	-0.1	-0.2	-0.2
Slovak Republic	0.9	0.5	0.4	0.3	0.2	0.3	0.3	0.2
Slovenia	0	0.4	-1.7	-0.7	-2.7	5.3	1.4	2.4
*this is the cumulated figure for 1992-2000								

Source: Eurostat (1999, 2000a, 2000b, 2001, 2002)

### *The brain drain*

We present evidence for skill biased migration from Romania from two types of sources: immigration data gathered by developed countries and emigration data from Romanian authorities. Based on this evidence we discuss the relevance of the phenomenon, future trends and also present estimates of human capital loss.

The first way of verifying that emigration from the CEECs is associated with a brain drain is to examine immigration flows into developed countries. The single attempt to estimate the brain drain from Eastern Europe in this manner is made by Straubhaar and Wolburg (1999) who, using unpublished Labour Force Survey data, build an image of skilled immigration into Germany from Eastern European countries between 1992 and 1994. It can be argued that these data do not offer a very faithful image, as they do not isolate labour migration from total flows. This would be meaningful, as immigration into Germany at the beginning of the 1990s is known to have had a strong ethnic character (Ghatak and Sassoon, 2001). Many Germans from Poland, the Czech Republic and Romania returned home in the first years after the fell of Communism, so that migration flows in this period are not entirely representative.

By examining the data in the table above we remark that migrants exhibit a higher level of human capital compared to the German population. The idea is more clearly illustrated in figure 3.1 on next page.

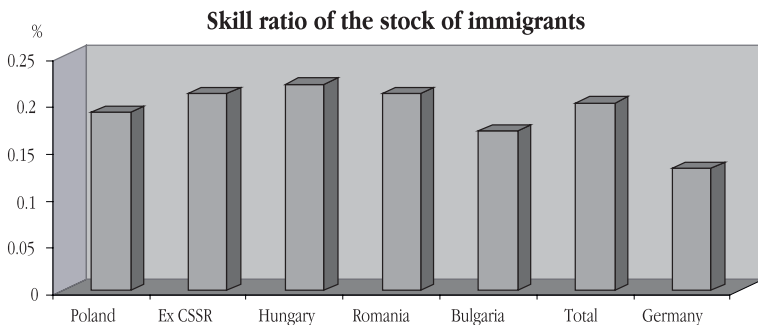
If we depart from the plausible assumption that the share of highly educated persons in the CEECs does not exceed the one in Germany, the idea that highly qualified persons emigrate over proportion-

ally holds (Straubhaar and Wolburg, 1999).

Table 3.2: East European skill ratios of immigration flows and stocks into Germany, 1992-1994

Sending Country	Aggregated Immigrants according to Qualification			
	Highly qualified	Total	Skill ratio (flows)	Skill ratio (stock)
	(in 1000s of persons)	(in 1000s of persons)	(in %)	(in %)
Poland	9.02	48.41	0.19	0.19
Ex CSSR	1.76	10.6	0.17	0.21
Hungary	3.78	10.87	0.35	0.22
<b>Romania</b>	<b>6.11</b>	<b>63.47</b>	<b>0.1</b>	<b>0.21</b>
Bulgaria	3.74	9.65	0.39	0.17
Total	24.41	143	0.24	0.2
German population				0.13

Figure 3.1: The skill ratio of stock of foreigners in Germany, 1992-1994 average



Source: Straubhaar and Wolburg, 2001

As far as Romanian emigration is concerned, *ex-post* self-selectivity is very strong, as the stock of Romanian nationals is much higher skilled than the flow of immigrants— 21% against 10%.<sup>5</sup>

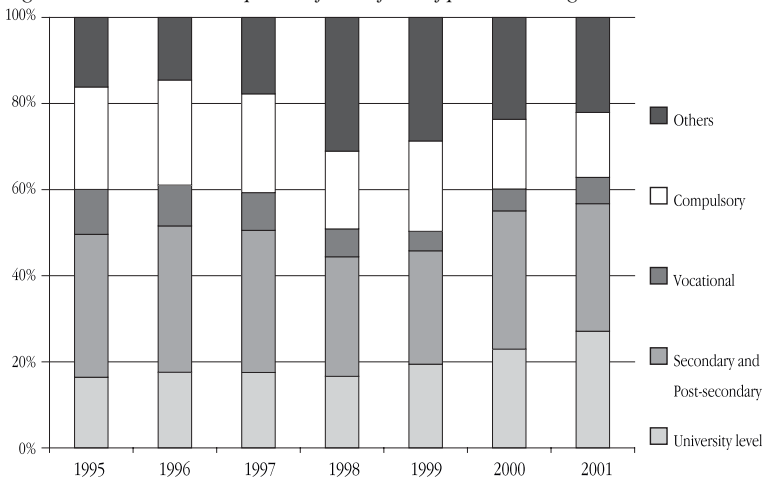
Thus, Straubhaar and Wolburg's study brings some evidence for the idea of an Eastern European brain drain and moreover there is some proof that the skill selection continues *ex-post* as only the most skilled remain on the long run.

Another way of studying the phenomenon is by using data and estimations from emigration studies. Such a study has been realized by the Romanian Ministry of Labour and Social Solidarity based on estimations of the National Institute of Statistics and the Ministry of Interior. These data also reveal a

<sup>5</sup> However the countries with the highest qualified flows of immigrants into Germany are also the only countries whose stock is less qualified than the flows, and by a significant amount. This is very difficult to explain.

bias towards skilled migration, which increased after 1998, as shown in figure 3.2. Thus the share of highly qualified permanent migrants in the total permanent flows approaches 30% in 2001 and together with secondary and post secondary migration it amounts to almost 60% of the total flows.

Figure 3.2: Educational composition for out-flows of permanent migrants



Source: MLSS, 2001

The macroeconomic situation of the country can shed some light on this evolution. As discussed in the theoretical part of the paper, a poor country is characterized by lack of opportunities. These combined from 1997 with a change in expectations as the country entered a deep recession proving that reforms had failed<sup>6</sup>.

Thus in the first part of the 90s there was confidence in the new regained freedom so that it appeared that Romania was not going to lose a considerable part of its highly skilled workforce. However, as expectations were repeatedly contradicted by evidence on failure of reforms, the share of highly skilled emigration became more significant<sup>7</sup>. The SOPEMI 2002 report 'Trends in International Migration' singles Romania among the CEECs as experiencing increased out-flows especially among the young and skilled. Their observations are summarized in the table below, sustaining the idea of a brain drain with focus on development relevant occupations: teachers and economists.

<sup>6</sup> GDP shrunk for three consecutive years in-between 1997-1999. For more details on Romania's macroeconomic situation see the report of the European Commission '2002 Regular Report on Romania's Progress Towards Accession', available at: [http://euroinfo.cdimn.org/doc/rap\\_tara.pdf](http://euroinfo.cdimn.org/doc/rap_tara.pdf)

<sup>7</sup> This trend is however concealed by total emigration figures, which have been declining. The same thing is observed related to Bulgaria – the emigration rate has decreased because of decline in emigration to neighboring states, while emigration to the West especially of students and skilled has increased (SOPEMI, 2002).

Table 3.3: Recent trends in emigration from Romania (2002 compared to 2001)

Emigration increased by 17%

Significant increases in certain groups:

ages 26-40	+ 34.7%
higher educational levels	+ 40.9%
teachers	+ 24.6%
economists	+ 38.4%

Source: SOPEMI, 2002

Nevertheless, some argue the phenomenon is insignificant, as the general migration rate is rather small. Thus even if the share of qualified people in the flow is considerable, the number of educated people that is lost is still rather limited. However, having in mind the bias of recent policies, it is probably the very best who migrate and the qualitative impact of the highest skilled people is bigger than it would appear.

Moreover, the 1997 and 1998 editions of the annual SOPEMI migration report signal the fact that outflows are seriously underestimated by Romanian authorities. The report mentions the example of Germany, where immigration data indicate flows of 380000 Romanian immigrants between 1991-1995, while Romanian authorities estimate only 55000 – that is 7 times smaller (Nedelcu, 2001).

Although the phenomenon is expectable, as emigration data are generally unreliable being based on personal customs declarations, its dimension is surprising. The evidence thus suggests that a large proportion of emigrants take advantage of other types of mobility opportunities - as temporary, educational or even tourism- and decide to stay on the long term, after arriving in the destination country (Nedelcu, 2001). This makes it harder to estimate the phenomenon in reliable statistics.

In addition, it is increasingly argued that the international mobility of students is a sizeable phenomenon and that many choose to stay on after completing their studies (SOPEMI, 2001) while there is no account for this type of mobility.

Therefore, although the volume of skilled emigration is not very impressive, figures show a troubling trend and moreover there is evidence that they might be fundamentally underestimated.

Related to the estimation of the brain drain effect on the level of human capital, we can provide only the estimations of Straubhaar and Wolburg (1999) for emigration to Germany in-between 1992-1994.

They compute the effect of the brain drain on the average stock of human capital by comparing the estimated initial share of highly qualified persons in the Eastern country with the corresponding share residing in Germany. They obtain a small marginal brain drain effect on the average level of human capital, shown in table 3.3 on next page.

Table 3.4: The Brain Drain's Effect on the Average Stock of Human Capital, 1992-94

Country	Absolute Change			Percent Change		
	$h_a=0.06$	$h_a=0.08$	$h_a=0.10$	$h_a=0.06$	$h_a=0.08$	$h_a=0.10$
Bulgaria	-0.0003	-0.0003	-0.0002	-0.51	-0.32	-0.2
Poland	-0.0006	-0.0005	-0.0004	-0.93	-0.59	-0.38
Hungary	-0.0008	-0.0012	-0.0006	-1.41	-1.46	-0.64
<b>Romania</b>	<b>-0.0004</b>	<b>-0.0003</b>	<b>-0.0003</b>	<b>-0.59</b>	<b>-0.38</b>	<b>-0.26</b>

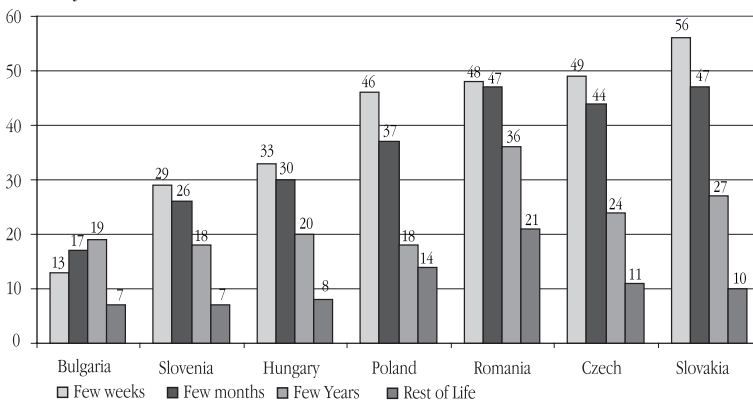
\* $h_a$  = by analogy to lower developed EU countries assumed average share of highly qualified persons at the population

Source: Straubhaar and Wolburg, 1999

### Uncertainty about migration

After establishing a case for a Romanian brain drain, our argument, following the theoretical outline of the previous chapter, is that the brain drain might be counterbalanced by the gain in human capital. As the potential of a beneficial effect is determined by the existence of uncertainty related to migration we search for empirical arguments by comparing the results of a survey on potential migrants against actual numbers.

Figure 3.3: Emigration intentions from CEECs by duration. (Percentage answering „very likely“ or „likely“)



Source: MLSS, 2001

In this purpose we consider the results of the IOM (1998) survey reporting on the magnitude of intentions to migrate (MLSS, 2001). Results reveal that Romanians have by far the highest propensity among Eastern Europeans to emigrate permanently. However, by comparing the percentage from this survey - 21% of the questioned have long term migration intentions- against actual emigration rates, a high level of uncertainty is suggested, which even after taking a reserve for inconsistent responses is favorable for a potential brain gain.

The socio-economic characteristics of the potential migrants are consistent with the characteristics of actual migrants, suggesting that the survey is reliable as an indicator. It confirms the propensity to

migrate of young highly educated people, especially men.

#### *Evidence of human capital gain*

Our theoretical argument claims that in conditions of uncertainty there is an *ex-ante* effect consisting in a stimulus on human capital formation which might offset the brain drain effect. Thus the brain drain effect estimated by Straubhaar and Wolburg is only part of the picture as they only take into account the human capital loss.

In order to see if the beneficial effect exists and if its magnitude is sufficient to engender an overall positive brain effect, we investigate some education related indicators.

First we calculate the change in tertiary enrollment between 1992 and 1994 in order to contrast it with the results of Straubhaar and Wolburg. Although it can be argued that their figures relate only to one destination country<sup>8</sup>, the increase is radically higher suggesting a brain gain.

For example in Romania the average level of human capital is estimated to have decreased by 0.6% because of emigration to Germany. As Germany accounts for around 20% of Romanian outflows (SOPEMI, 2002), by keeping proportions we arrive at a loss of around 3% in total, against an increase in tertiary enrollment by 22%. Although the indicators we are discussing are not totally comparable, we believe they give a strong indication to a much higher human capital gain compared to the estimated loss.

*Table 3.5: Evolution of tertiary enrolment in-between 1992-1994*

	1992	1993	1994	Absolute change	Percent change
Bulgaria	31.4	33.2	35.4	4	13%
Czech Republic	14.6	19.6	20.8	6.2	42%
Hungary	15.1	18.1	20.9	5.8	38%
Poland	23.4	33.8	26.1	2.7	12%
<b>Romania</b>	<b>16.1</b>	<b>18.7</b>	<b>19.7</b>	<b>3.6</b>	<b>22%</b>

*Source: own calculations based on UNESCO data*

For a more complete image we look at the evolution of enrollment ratios in-between 1990-2000 for all the CEECs and calculate the percent change over the period.

The increase in enrolment in tertiary education is impressive. It is especially encouraging that the countries that in 1990 had the lowest rates exhibit the most radical evolution.

Thus Romania combines the biggest increase in its ratio with the most unfavourable starting point. This confirms Mounford's argument that the brain gain is more likely in countries with an initial lower level of human capital. Even though it still has the lowest enrolment ratios among the CEECs, there is evidence of closing the gap with some countries.

<sup>8</sup> Germany accounts for around 20% of Romanian outflows (SOPEMI, 2002).

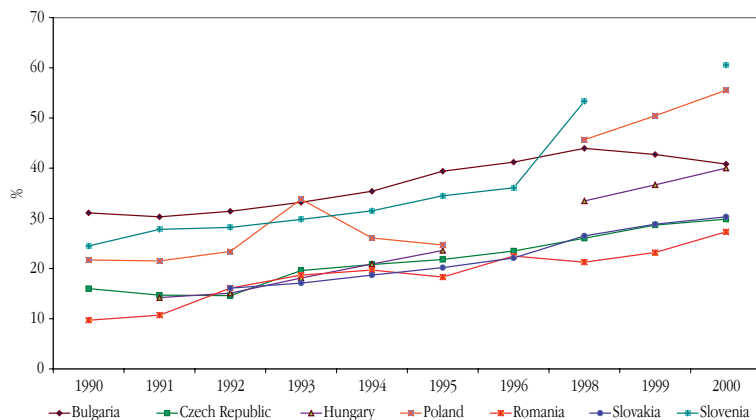
Table 3.6: Evolution of enrolment ratios in tertiary education (in %)

	1990	1991	1992	1993	1994	1995	1996	1998	1999	2000	change in %
Bulgaria	31.1	30.3	31.4	33.2	35.4	39.4	41.2	43.96	42.72	40.82	31
Czech Republic	16	14.7	14.6	19.6	20.8	21.8	23.5	26.05	28.66	29.84	87
Hungary		14.2	15.1	18.1	20.9	23.6		33.48	36.69	40.01	182
Poland	21.7	21.5	23.4	33.8	26.1	24.7		45.68	50.44	55.54	156
<b>Romania</b>	<b>9.7</b>	<b>10.7</b>	<b>16.1</b>	<b>18.7</b>	<b>19.7</b>	<b>18.3</b>	<b>22.5</b>	<b>21.27</b>	<b>23.21</b>	<b>27.32</b>	<b>182</b>
Slovakia			16.1	17.1	18.7	20.2	22.1	26.50	28.85	30.32	88
Slovenia	24.5	27.8	28.2	29.8	31.5	34.5	36.1	53.33		60.55	147

Source: CEPES, UNESCO

Figure 3.4 on next page illustrates the evolution of all CEECs. Bulgaria is an exception with a considerably lower increase in enrolment, but this is only because in 1990 it had the highest ratio compared to the other countries in the region. However, the number of new students is decreasing after 1998.

Figure 3.4: Enrolment ratios in tertiary education, 1990-2000



Source: based on data from MLSS, 2001

The amount of tertiary education is indicated also by the number of corresponding institutions. Although the only available data are for the academic years 1999/2000 and 2000/2001, it is very useful that they distinguish between private and public institutions. Due to the fact that under Communism education was almost exclusively public, the figures related to private universities can provide an image of the total increase in the number of institutions for higher education.

Table 3.2: Institutions of higher education in CEECs

	Number of institutions in 1999					Number of institutions in 2000				
	public	%	private	%	total	public	%	private	%	total
Bulgaria	79	89.7	9	10.3	88	79	89.7	9	10.3	88
Czech Rep	27	90	3	10	30	28	66.7	14	33.3	42
Hungary	55	61.8	34	38.2	89	30	48.4	32	51.6	62
Poland	104	36.3	182	63.7	286	115	37.1	195	62.9	310
<b>Romania</b>	<b>57</b>	<b>40.7</b>	<b>83</b>	<b>59.3</b>	<b>140</b>	<b>57</b>	<b>40.7</b>	<b>83</b>	<b>59.3</b>	<b>140</b>
Slovakia	22	95.7	1	4.3	23	18	90	2	10	20
Slovenia	806	69.5	353	30.5	1159	816	83.3	163	16.4	979

Source: CEPES

In Romania all private universities were founded after the fall of Communism, so that their number approximates the total increase. In the academic year 2000/2001 they amount to a remarkable 60% of the total number of institutions. As far as we know, a marginal increase is provided also by the apparition of new public universities.

Another relevant indicator is the percentage of the labour force that has tertiary education. Although the evolution is not as convincing as in the case of enrolment ratios, there is still an upward trend<sup>9</sup>. This is not so strong probably because the evolution of highly skilled labour force until 1997 can correspond to the evolution of enrolment in tertiary education only until 1993.

Table 3.8: Labour force over 15 with tertiary education (% of labour force)

	1992	1993	1994	1995	1996	1997	% change over the period
Bulgaria	17.6	17.4	18.3	18.8	19.1	19.3	9.66
Czech Rep	9.6	10.4	9.9	10.5	10.4	10.7	11.46
Hungary	13.4	13.5	13.5	14.3	15	13.9	3.73
Poland	13	12.7	12.8	13.8	13.7	14	7.69
Romania			7.6	13	12.3	12.4	63.16
Slovakia		12.4	11.7	41.4	11.7	44	254.84
Slovenia		15.1	15.3	14.7	13.8	13.5	-10.60

Source: ILO, 1999

### Conclusion

This section has shed some empirical light over our discussion. The existing evidence, although severely unsatisfactory, suggests that for most of CEECs the brain drain did not prove to be a serious problem. However, for countries like Bulgaria and Romania that lag economically behind the others and faced serious crises in the second half of the 1990s, the brain drain has recently gained impor-

<sup>9</sup> The evolution in Slovakia is highly volatile, to such an extent that it places under question the reliability of data.



tance.

Our theoretical hypothesis of a gain in human capital seems now empirically sustainable as enrolment rates and number of institutions for higher education have grown considerably. There are of course other factors which contributed to this evolution, but the fact that the recession from 1996-99 did not impinge upon education rates but on the contrary these continued to grow, suggests that people found their motivation in migration prospects.

Despite its economic evolution, Romania exhibits one the highest gains in human capital compared to the other CEECs. This fact is consistent with the theoretical prediction that a brain gain is more likely for countries combining low levels of migration with initial low levels of human capital. Indeed, among the CEECs Romania had the lowest enrollment ratio at the beginning of the 90s.

Although our result is encouraging suggesting an overall brain gain, the data are very limited and there might be a serious problem of underestimation related to emigration flows.

#### 4. Potential *Ex-Post* Beneficial Effects

Despite the fact that the new endogenous growth theory is a step forward in recognizing the importance of human capital, the view it offers is still very limited. Skill acquisition is treated like any other production process and skill itself as a form of physical capital (Green, 1992) in an individualistic approach that ignores the social underpinning of an economy. However, human capital is not an aggregate like physical capital, but a structure with complex interactive links and spillovers between its 'components'<sup>10</sup>.

Moreover, recent developments in the sociology of science and technology emphasize the idea that the processes of knowledge creation, transmission and application are collective and thus scientific communities perform not only a social or institutional role, but are socio-cognitive communities (Meyer and Brown, 1999).

##### *The concept of social capital*

Correspondingly, the idea that economics deals not merely with individuals, but with social groups is beginning to be considered by economists under the umbrella of the 'social capital' concept, which is recognized as an input or argument of the utility or production function.

Social capital has been given much attention lately, especially in the World Bank's development programs, being seen as the missing link in development. It is an acknowledgement of economists of the importance of the social, although as Fine (2000) argues, the concept is used deficiently to complement and not to fundamentally reassess existing views<sup>11</sup>.

The study by Schiff (1999) is the only migration model that incorporates social capital. In a model of North-South migration he argues that the movement of people differs from the movement of goods and services because of the social relations between them (Schiff, 1999). He uses social capital, as defined by Coleman<sup>12</sup> "... the set of elements of the social structure that affect relations among

10 There is also a debate related to the aggregation of physical capital – see Harcourt G. (1969) 'Some Cambridge Controversies in the Theory of Capital', *Journal of Economic Literature*, 7(2)

11 The concept is very controversial – for an extensive critique see Fine (2000).

12 The concept was first introduced by Bourdieu, although he is decreasingly recognised as such, who emphasized the social construction of social capital and the link with social stratification (Fine, 2000). Most authors draw however on the more functional approaches of Coleman or Putman.

people and are inputs or arguments of the utility and/or production function" (Schiff, 1999). These elements including social norms, attitudes, values, language and culture may generate economic benefits by rising utility and even output. For example trust and enforceability of sanctions reduce transaction costs.

Schiff conceives social capital as a negative externality in the process of migration – both the origin and receiving community suffer a loss in social capital. The assumption is that people prefer to associate with those sharing the same norms and values, i.e. the same type of social capital. This is supported by evidence from the U.S. and the EU that most immigrants are not distributed randomly across the receiving country (Schiff, 1999). Rather, immigrants from a given country tend to cluster in specific cities and neighbourhoods in order to benefit from the common social capital<sup>13</sup>.

Thus migration results in a social capital drain (Schiff, 1999), as in both receiving and sending countries social capital depends negatively on level of migration. Moreover, even if Schiff does not specifically refer to high skilled, they are likely to play a relatively more important role as there have fewer substitutes. It is argued that in a developing country they are also likely to play a role in informal education through instruction and example to their fellow citizens (Walter, 1968).

Although we do not challenge the idea that emigrants leave an 'empty space' in their families and work place, thus lowering the social capital, Schiff's perspective on the links between migration and social capital is very simplistic and static. Although he assumes that social capital is conditioned by physical presence, we shall argue that thanks to recent developments in communication technology it can be preserved and thus constitute an essential part in the migratory process.

As far as the brain drain model in the previous chapter is concerned, social capital can help the understanding of the intergenerational and production spillovers that add dynamics to the brain drain model in the previous chapter. Production can be seen as a chain precisely because there is a social content and people do not act merely as individuals but are influenced and influence the social structures and other individuals.

#### *An ex-post channel for a brain gain: diaspora networks*

Social capital is highly relevant in understanding another channel for brain gain. Although Schiff asserts that through migration social capital is inevitably lost, the evidence shows that future migrants develop counteractive strategies. Social capital may become part of the migration strategy in combination with human capital, as Nedelcu (2001) argues, through migration networks, which link migrants with other migrants, potential migrants and non-migrants. Supported by the Internet, these networks reduce costs and uncertainty related to migration through the exchange of relevant information between those already at the destination and future migrants. Thus the success of the migration project depends on both human capital and social capital.

Nedelcu (2001) brings empirical support for this idea through a study of Romanian IT migration to Canada. She finds a strong nucleus of mobility in a Romanian city organized initially around a group with close personal relations and similar professional interests. In time the organizing idea of the group becomes professional mobility and the ones that have already moved facilitate the emigration of others. Moreover, expatriates have involved themselves in business projects with companies at

13 For instance, in the U.S., immigrant neighbourhoods include Little Havana in Miami, Chinatown in San Francisco, Greek town in Chicago and Little Italy in New York.

home, thus contributing to the local development of IT industry (Nedelcu, 2001).

Therefore, social capital also plays a relevant role in the potential for brain gain. Although people decide to move for better opportunities, they retain connections and networks back to their home country. When these networks are fostered they can yield a flow back of knowledge and new technologies that can boost source country growth. The important advances in communication technology may be limiting the extent to which skills are actually lost (OECD, 2001). Especially because people tend to associate with people sharing the same norms and values, networks of expatriates have a high potential of effective links and thus the highly skilled can effectively contribute to the development of their country even if they are not physically at home.

Meyer and Brown (1999) identify more types of knowledge networks among which intellectual/scientific diaspora networks have as specific purpose the impact on the development of the origin country. These networks are heavily reliant on the Internet and engage in various joint developmental projects with government agencies and private and non-profit organizations at home. Their actions consist mainly of research projects, technology transfer and expert consulting, training courses and bringing foreign based companies in the home country (Meyer and Brown, 1999). Moreover, they can have a multiplier effect due to the fact that they are connected with expatriates' own socio-occupational networks (OECD, 2001).

As regards Eastern Europe, there are a Polish, a Hungarian and a Romanian network. The FORS Foundation for example is a non governmental initiative that seeks to involve Romanian scientists both in Romania and abroad in contributing to the process of economic reform and socio-economic development in Romania (Meyer and Brown, 1999). Meyer and Brown (1999) classify it as a 'developing network' and unfortunately we are not able to provide more recent information on its evolution.

The success of these networks in terms of input or impact on the development of the home country is difficult to determine. The exchanges that result between network members and the national community – for example scientific meetings, email information/data exchanges, training sessions, informal advisory opinions – do not always bring tangible, visible or immediate results and do not allow for a statistical assessment (Meyer and Brown, 1999). Nevertheless, this does not mean that these exchanges are not significant.

One measure of their efficiency is the fact that so many countries have developed such networks (Meyer and Brown identify 41) and many are functioning for over a decade and none has dissolved (Meyer and Brown, 1999) suggesting that they constitute a significant strategy.

The potential effectiveness of such networks is indicated by the amount of social capital shared by emigrants and by the level of their human capital. According to Paldam and Svendsen (2000) one reliable measure of social capital is the density of voluntary associations in which they are involved. We have done a by no means exhaustive research regarding the Romanian intellectual diaspora<sup>14</sup> and found that there are indeed many migration-related networks. These include 20 sites of Romanian students' communities at universities in US, France and UK, projects for databases of Romanian students and researchers abroad and a Romanian Intellectual Network which is trying to foster contact between highly skilled expatriates.

Therefore, although this is a new strategy and still developing, the international diaspora has an

<sup>14</sup> So that we also control the level of human capital

impressive potential of information, skills flows, constituting a prospective *ex-post* channel of brain gain.

Another more traditional potential for brain gain is through return migration. When migrants return home they are likely to bring back experience, financial resources, links to networks and new skills which can be productively used. There is some evidence that returnees tend to opt for entrepreneurship and highly educated individuals are more likely to be active after return (Commander, 2001). Most examples relate to the Asian NICs<sup>15</sup>. Taiwan for example faced significant outflows of students in the 60s and 70s. However in the 80s, as opportunities in the country changed, returnees increased dramatically having a central role in subsequently developing the country's ICT sector (Commander, 2001). Clearly there is a combination of factors contributing to the phenomenon: ability to secure employment in the host country, opportunities in the home country and its ability to absorb returnees (Commander, 2001). However, Romania does not yet fulfill these economic prerequisites, such that this channel for a brain gain is still unlikely.

## 5. Concluding Remarks

The purpose of this paper was to analyze the developmental implications of skilled migration for the sending countries. In addition to the direct human capital loss with its corresponding detrimental growth effect, we have discussed two channels for beneficial effects. Firstly because migration is an uncertain project, the number of potential migrants who invest in human capital is greater than the number of actual migrants and hence an *ex-ante* brain gain consisting in additional accumulation of human capital.

After migration has taken place, because the highly skilled expatriates share the same social capital with their co-nationals, there is an important potential for effective links and involvement in developmental projects. This is the possibility of an *ex-post* brain gain. Additionally, there is the option (ideal) of return migration with expatriates bringing home new skills, experience and financial resources. This however has certain prerequisites regarding the level of development of the country.

### *Directions for further theoretical research*

The approach of the endogenous growth theory that confers a central role to human capital in development intensifies the negative implications of skilled migration. However, a new way of thinking about migration is developing although there is still much place for future research.

The crucial point of the models we presented is the mechanism that creates more educated workers than actually leave (Commander, 2001). Mountford (1997) bases his models on changed incentives and imperfect information. The idea of changed incentives is also used by Haque and Kim (1995), although not so clearly put forward. The optimal education investment is different if people want to migrate in the second period. However as migration is free and certain, the people who are taking more education because of migration will actually migrate causing a brain drain.

Therefore, the new idea that Mountford (1997) introduces in the literature and which makes brain gain possible is the uncertainty of migration. This is due to imperfect information and generates increased incentives to pursue education but in the same time leaves part of the educated workers at

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home (Commander, 2001).

It is fundamental that every educated individual has a certain possibility of migration (even if this may vary with ability) and hence all experience increased expected returns i.e. enhanced incentives to acquire education. By contrast, if we assume perfect screening, it will be known that only the top  $M$  will migrate and the expected returns will stay unchanged for the rest (Commander, 2001).

Clearly, perfect screening is impossible as Commander also admits, but even improved screening diminishes the positive impact. However it can be reasoned that individuals take their education decision a period before, so there is uncertainty related to the time lag between the education investment and migration – opportunities abroad or immigration policies can change in time. Uncertainty is also emphasized by subjective expectations – so the agents can be overly optimistic about their projects (Commander, 2001). Moreover education is not a perfect signal for the individual skills so a certain degree of asymmetric information undoubtedly prevails (Beine et al., 2001).

The theoretical models developed by Mountford show the manner in which the brain drain can be beneficial for the growth of the economy. However, it is not only the rate of growth that counts, but also the rate of growth relative to that of the receiving country. Even if the sending country benefits from brain migration, the gain of the receiving country from the immigrants might be bigger and overall the disparities between countries might broaden. In this respect what matters is the human capital level of immigrants relative to the average level in the receiving country. Consequently, it is important to develop the study of the issue also in two countries models between which migration takes place.

Moreover, the issue of sectoral biased migration has not been studied. Recent trends in skilled migration suggest that it is concentrated in certain sectors – IT and health for example (Commander, 2001). The different implications of these sectors upon the economy should be studied as their impact on development and growth varies.

A new kind of skilled migration and labour reserve emerges as the link between education and migration has started to change. The international mobility of students has significantly increased, being discussed in a dedicated chapter in the 2001 SOPEMI report on trends in international migration. They argue that student migration is both a form and a precursor of skilled migration. Students participate in the economy of the host country through research activity or internships. Moreover, their migration is in some cases a precursor of long term migration as international education might be part of the migration strategy. Indeed, a degree in the host country or in another developed country is a 'recognizable' signal to employers of competitive skills, as well as a guarantee for good master of the language, thus easing the process of labour market entry. This argument is sustained by conclusions from more empirical studies (see SOPEMI, 2001).

As far as the discussion around the potential of diaspora networks in development is concerned, we tried to provide a sound theoretical underpinning. However, the concept itself of social capital is under heavy controversy, as being very vague and ambiguous (Fine, 2000), a metaphor for the social content of the economy which however avoids analysing it. Critics argue that the danger is that instead of enriching development studies and allowing more integrative approaches, it will sooner consolidate the economic reductionism of the social to market imperfections (Fine, 2000).

Although it is certainly reductionist and simplistic to sum up an entire science under the umbrella of one concept, we argue that it still opens up a more progressive theoretical and policy agenda as an

economic tool that enables a broader perspective including the social.

Research in this direction has only made its first steps. As there is a strong social content underlying human capital, we argue that interdisciplinary research would be most relevant to the topic.

#### *Data issues*

As far as our case study is concerned, there were large limitations due to lack of data sources. The problem regarding the record of flows of highly skilled persons is general. Among the major destination countries, only the United States keep immigration data according to qualifications. Having in mind that destinations are concentrated in proportion of 93% to 5 countries- Australia, Canada, France, Germany, and the US -, if these would keep records the problem would more or less be solved (Carrington and Detragiache, 1998).

The fact that there is no solid knowledge on the empirical magnitude of the phenomenon also hinders theoretical research. Moreover, because policy makers do not have the relevant information, there are no coherent policy frameworks to deal with the phenomenon and its implications. As far as diaspora networks are concerned for example, they are highly dependent on support that they receive from both countries because of their intermediate position (OECD, 2001).

Through our analysis we have hopefully developed a new perspective on migration. Recent research is set in a framework emphasizing the central role of human capital in development, thus relating highly skilled migration to one of the central concerns of economics – the process of growth. The perspective is more dynamic, covering both prospective migration and *ex-post* evolution. Moreover the approach is more complex incorporating the analysis of incentives faced by individuals, informational asymmetries and even a sociological perspective through the concept of social capital. All in all we gain a richer understanding on the far-reaching implications of highly skilled migration thus seeing it not only as a brain drain but also as a brain gain.

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